

WHAT IS CLAIMED is:

1. A DC-DC converter circuit comprising:
an oscillator which produces a signal;
a voltage generating circuit which is supplied
5 with a first voltage and responsive to the output
signal of the oscillator to generate a second voltage
different from the first voltage;
a voltage detecting circuit which is connected to
the output of the voltage generating circuit to detect
10 the second voltage output from the voltage generating
circuit and output an output voltage corresponding to
the second voltage; and
a comparator which is supplied with the output
signal of the oscillator, the output voltage of the
15 voltage detecting circuit, and a reference voltage, the
comparator making a comparison between the output
voltage of the voltage detecting circuit and the
reference voltage with each cycle of the output signal
of the oscillator and controlling the operation of the
20 voltage generating circuit in accordance with the
result of the comparison.

2. The circuit according to claim 1, wherein the
voltage generating circuit is a pump circuit which
boosts the first voltage to generate the second voltage
25 in response to the output signal of the oscillator.

3. The circuit according to claim 1, wherein the
voltage generating circuit comprises a transistor

connected between its input supplied with the first
voltage and its output and a drive circuit which drives
the transistor in response to the output signal of the
oscillator to lower the first voltage and generate the
5 second voltage at the output of the voltage generating
circuit.

4. The circuit according to claim 1, wherein the
comparator is a synchronous comparator which operates
in synchronism with the output signal of the
10 oscillator.

5. A DC-DC converter circuit comprising:
an oscillator which produces a signal;
a timing generator which is supplied with the
output signal of the oscillator to generate a plurality
15 of timing signals;

a pump circuit which is supplied with the timing
signals from the timing generator and a first voltage
to generate a second voltage higher than the first
voltage in response to the timing signals;

20 a voltage detecting circuit which is connected to
the output of the pump circuit to detect the second
voltage output from the pump circuit and output an
output voltage corresponding to the second voltage; and

a comparator which is supplied with the output
25 signal of the oscillator, the output voltage of the
voltage detecting circuit, and a reference voltage, the
comparator making a comparison between the output

voltage of the voltage detecting circuit and the reference voltage with each cycle of the output signal of the oscillator and controlling the operation of the timing generator.

5 6. The circuit according to claim 5, wherein the comparator is a synchronous comparator which operates in synchronism with the output signal of the oscillator.

10 7. The circuit according to claim 5, wherein the oscillator comprises a plurality of inverter circuits which are connected in series, and series combinations each of a resistance component and a capacitance component, each of the series combinations being connected between the output of a respective one of the
15 inverter circuits and ground, and the oscillation frequency is varied by changing one of the resistance component and the capacitance component of each of the series combinations.

20 8. The circuit according to claim 5, wherein the timing generator includes an edge-triggered pulse generator, and the pump circuit completes one pumping operation in response to an output signal of the timing generator when the signal of the oscillator is interrupted.

25 9. A DC-DC converter circuit comprising:
 a first pulse generator responsive to an input signal to output a first pulse signal;

first and second switch circuits which are supplied with the first pulse signal output from the first pulse generator;

5 a second pulse generator which is connected to the output of the first switch circuit to output a plurality of second pulse signals in response to the output signal of the first pulse generator supplied from the first switch circuit;

10 a pump circuit which is supplied with the plurality of second pulse signals output from the second pulse generator and a first voltage and boosts the first voltage to a second voltage in response to the plurality of second pulse signals;

15 a voltage detecting circuit which is connected to the output of the pump circuit to detect the second voltage output from the pump circuit and output an output voltage corresponding to the second voltage;

20 a comparator which is supplied with the first pulse signal output from the first pulse generator, the output voltage of the voltage detecting circuit, and a reference voltage, the comparator making a comparison between the output voltage of the voltage detecting circuit and the reference voltage with each cycle of the first pulse signal and turning the first switch
25 circuit off and the second switch circuit on when the output voltage of the voltage detecting circuit is higher than the reference voltage; and

a third pulse generator which is connected to the output of the second switch circuit to generate a third pulse signal and apply it to the first pulse generator in response to the output signal of the first pulse generator supplied via the second switch circuit.

10. The circuit according to claim 9, wherein the comparator is a synchronous comparator which operates in synchronism with the first pulse signal from the first pulse generator.

11. The circuit according to claim 9, wherein each of the first, second and third pulse generators is an edge-triggered pulse generator.

12. The circuit according to claim 9, wherein the third pulse generator is a pulse oscillator which has its output pulse width varied by a control signal, and the pulse width of the third pulse signal output from the third pulse generator when the pump circuit is shut down is wider than when the pump circuit is operating.

13. A DC-DC converter circuit comprising:

a first oscillator which output a first pulse signal;

a second oscillator which output a second pulse signal;

a timing generator which is supplied with the first pulse signal output from the first oscillator to generate a plurality of timing signals;

a pump circuit which is supplied with the timing

signals from the timing generator and a first voltage to boost the first voltage to a second voltage in response to the timing signals;

5 a voltage detecting circuit which is connected to the output of the pump circuit to detect the second voltage output from the pump circuit and output an output voltage corresponding to the second voltage; and

10 a comparator which is supplied with the first and second pulse signals output from the first and second oscillators, the output voltage of the voltage detecting circuit, and a reference voltage, the comparator making a comparison between the output voltage of the voltage detecting circuit and the reference voltage with each cycle of one of the first and second pulse signals and turning the first
15 oscillator off and the second oscillator on when the output voltage of the voltage detecting circuit is higher than the reference voltage.

20 14. The circuit according to claim 13, wherein the timing generator includes an edge-triggered pulse generator, and the pump circuit completes one pumping operation in response to an output signal of the timing generator when the signal of the oscillator is interrupted.

25 15. The circuit according to claim 13, wherein the comparator is a synchronous comparator which operates in synchronism with the first and second pulse signals.

16. A DC-DC converter circuit comprising:

a first pulse generator which generates a first pulse signal;

5 a second pulse generator which is connected to the first pulse generator to generate a second pulse signal in response to the first pulse signal;

a third pulse generator which generates a third pulse signal;

10 a pump circuit which is supplied with the second pulse signal output from the second pulse generator and a first voltage and boosts the first voltage to a second voltage in response to the second pulse signal;

15 a voltage detecting circuit which is connected to the output of the pump circuit to detect the second voltage output from the pump circuit and output an output voltage corresponding to the second voltage; and

20 a comparator which is supplied with the first and third pulse signals output from the first and third pulse generators, the output voltage of the voltage detecting circuit, and a reference voltage, the comparator making a comparison between the output voltage of the voltage detecting circuit and the reference voltage with each cycle of one of the first and third pulse signals and turning the first pulse
25 generator off and the second pulse generator on when the output voltage of the voltage detecting circuit is higher than the reference voltage.

17. The circuit according to claim 16, wherein each of the first, second and third pulse generators is an edge-triggered pulse generator.

18. The circuit according to claim 16, wherein the
5 comparator is a synchronous comparator which operates in synchronism with the first and third pulse signals.

19. A DC-DC converter circuit comprising:
an oscillator which produces a signal;
a transistor connected between a first power
10 supply and an output terminal;
a drive circuit which is responsive to the output signal of the oscillator to drive the transistor;
a voltage detecting circuit which is connected to the output terminal to detect the voltage output from
15 the output terminal and output an output voltage corresponding to the voltage at the output terminal;
and

a comparator which is supplied with the output
signal of the oscillator, the output voltage of the
20 voltage detecting circuit, and a reference voltage, the comparator making a comparison between the output voltage of the voltage detecting circuit and the reference voltage with each cycle of the output signal of the oscillator and controlling the operation of the
25 drive circuit.

20. The circuit according to claim 19, wherein the drive circuit includes a plurality of inverter circuits

formed of transistors different in size.

21. The circuit according to claim 19, wherein the comparator is a synchronous comparator which operates in synchronism with the output signal of the oscillator.

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